UMTRA Ground Water Project

FACT SHEET

U.S. Department of Energy
Grand Junction Office

Uranium Mill Tailings Remedial Action (UMTRA) Ground Water Project at Shiprock, New Mexico

This fact sheet provides information about the UMTRA Ground Water Project site at Shiprock, New Mexico. The U.S. Department of Energy Grand Junction Office in Grand Junction, Colorado, manages the UMTRA Ground Water Project.

Site Description and History

The Shiprock UMTRA Ground Water Project site is within the Navajo Nation in northwestern New Mexico, about 28 miles west of Farmington (see Figure 1). The site is accessible by Uranium Boulevard that extends from U.S. Highway 666 eastward about 0.5 mile to the Navajo Engineering and Construction Authority (NECA) facility.

The Shiprock uranium and vanadium ore-processing mill, known as the Navajo Mill, was operated by Kerr-McGee Oil Industries, Inc., from November 1954 to March 1963 when it was sold to the Vanadium Corporation of America. The Vanadium Corporation of America operated the mill until August 1967 when the company merged with Foote Mineral Company and continued operation of the mill until ore processing ended in August 1968. Before and during milling operations, the site was leased from the Navajo Nation. In 1973, the lease expired and the site ownership reverted to the Navajo Nation. During its life, the mill processed about 1.5 million tons of ore and produced tailings as a by-product of milling operations.

When the millsite and tailings property reverted to control of the Navajo Nation, NECA obtained a lease for the site, occupied the former plant office and shop buildings, and started a training school on the site to train Navajo students to operate earth-moving equipment. Soon thereafter, the Navajo Tribal Chairman asked representatives of the U.S. Environmental Protection Agency (EPA) and other federal agencies for assistance in stabilizing the tailings piles. In response, EPA conducted radiation surveys at the site in April 1974. Following this evaluation, EPA recommended decontaminating the site and stabilizing the tailings.

Decontamination work at the Shiprock site began in January 1975 and was conducted primarily by NECA trainees under EPA guidance. These activities continued with NECA trainees until mid-1978 and with other NECA personnel until 1980. In the early 1980s, the UMTRA Surface Project, which was managed by the U.S. Department of Energy (DOE), conducted surface and ground-water characterization studies prior to surface cleanup of the site. DOE completed construction of a disposal cell at the site in 1986 for mill tailings and tailings-contaminated material.

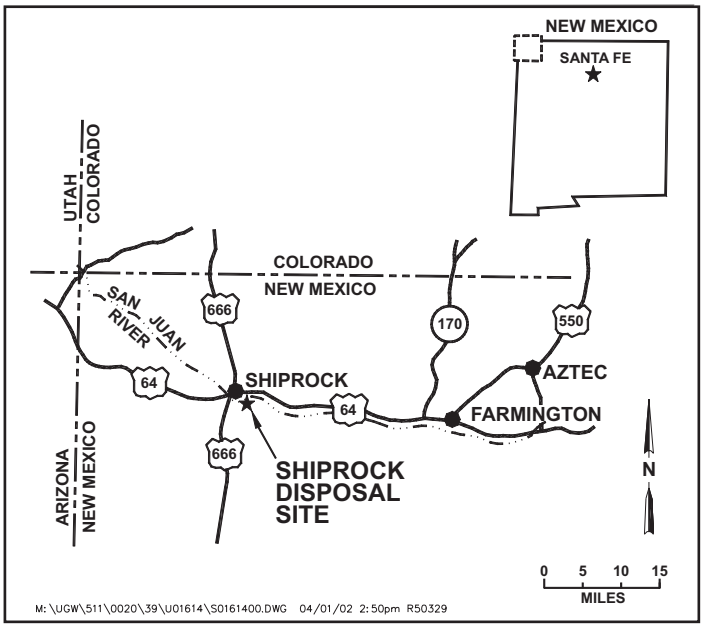

Figure 1. Location of Shiprock UMTRA Ground Water Project Site

Large quantities of water used to process the ores during milling introduced contamination into ground water underlying the millsite and the adjacent floodplain of the San Juan River. During surface cleanup in the mid-1980s, authorization was not in place to clean up the contaminated ground water.

Topographic and hydrologic features divide the site into two regions known as the floodplain and the terrace (see Figure 2 and Figure 3). A cliff of exposed Mancos Shale, referred to as the escarpment, separates the floodplain from the terrace. Alluvial ground water in the floodplain is in contact with the San Juan River and also receives inflow from the terrace ground water system.

The UMTRA Ground Water Project divided the terrace into terrace east and terrace west areas, reflecting different degrees of contamination and different sources of ground water recharge. The disposal cell and adjacent former millsite are in the terrace east area.

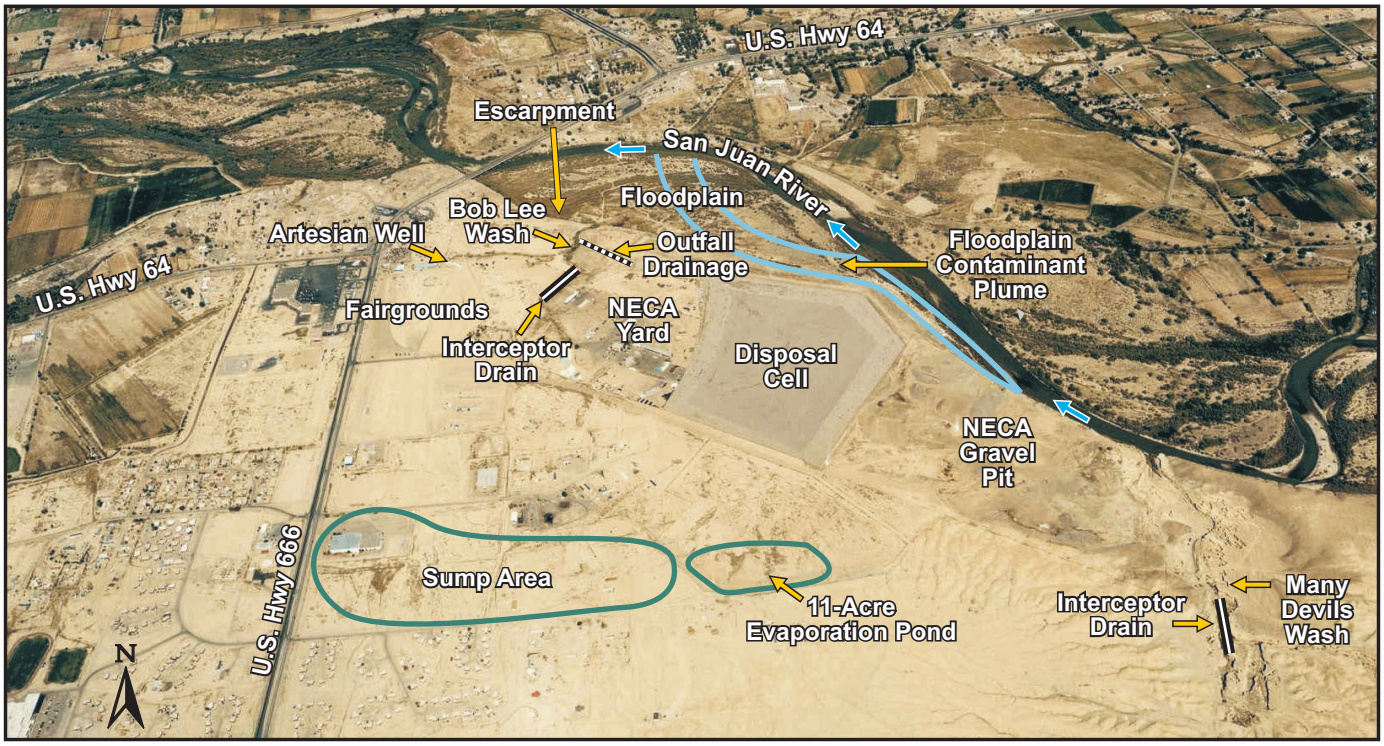

Figure 2. View of the Shiprock Site

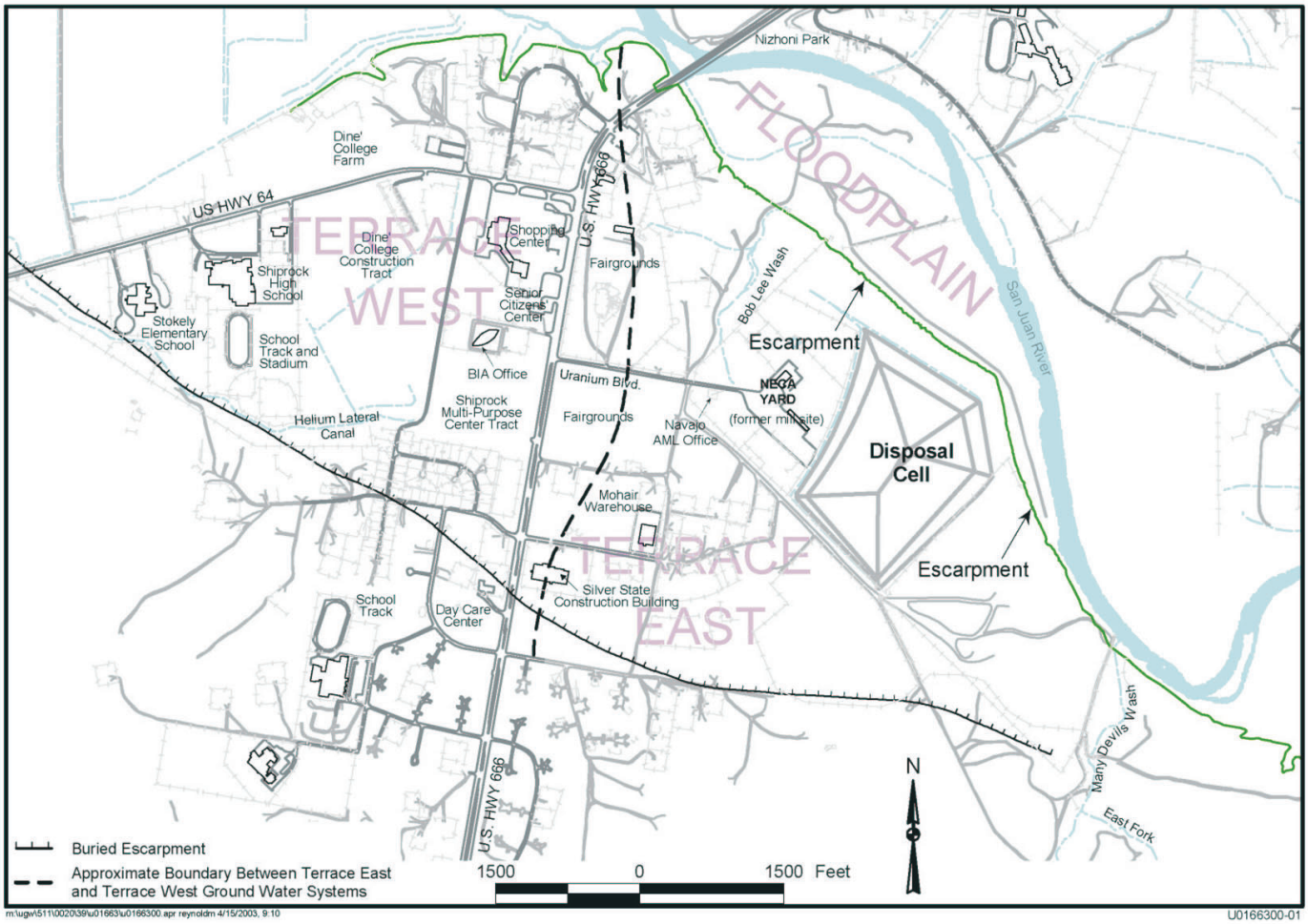

Figure 3. Terrace West, Terrace East, and Floodplain Areas

Ground water contaminants in the floodplain are in the uppermost aquifer that consists of alluvium and weathered Mancos Shale. Ground water contaminants in the terrace are in the terrace ground water system that consists of alluvium and weathered Mancos Shale.

Floodplain ground water constituents of potential concern for human health are manganese, nitrate, selenium, sulfate, and uranium; ammonium and strontium are of potential concern to the ecology in this area. Similar constituents of concern apply to the San Juan River adjacent to the floodplain where risk is extremely low, owing to the dilution effect of the high-volume river flow. Constituents of potential concern in the terrace ground water system are ammonium, manganese, nitrate, selenium, strontium, sulfate, and uranium.

Compliance Strategies

Three compliance strategies are being implemented for the Shiprock site: one each for the floodplain, the terrace east area, and the terrace west area.

The compliance strategy for the aquifer in the floodplain is natural flushing and monitoring supplemented by some removal of contaminant mass from the plume. Natural flushing should remove mill-related constituents within 100 years. In the natural flushing strategy, natural geochemical and biological processes and ground water movement decrease ground water contaminant concentrations through time. The effectiveness of the flushing will be determined by long-term monitoring. During the initial 10 to 20 years, contaminant removal will consist of pumping contaminated ground water from two extraction wells in the most contaminated part of the floodplain aquifer next to the San Juan River. This contaminated water will be piped to an 11-acre pond on the terrace and evaporated. During the natural flushing period (up to 100 years), use of the ground water would be restricted through institutional controls that would prohibit grazing, prohibit drilling of new water wells, and ensure that artesian well 648 on the terrace continues to flow and supply water to the floodplain.

The compliance strategy for the terrace east area is active remediation using interceptor drains and extraction wells to collect contaminated water. This water, from at least four extraction wells in what is referred to as the sump area of terrace east and from interceptor drains in Many Devils and Bob Lee Washes, will be piped to the evaporation pond on the terrace. An interceptor drain just west of Many Devils Wash will collect ground water moving eastward toward the wash. Similarly, an interceptor drain just east of Bob Lee Wash will collect ground water moving west from the former millsite toward the wash. These actions will continue for approximately 7 years until the terrace ground water system is hydrologically disconnected from the washes and the seeps along the escarpment. Select wells and surface water locations will be monitored and sampled semiannually for 5 years after the start of remedial action to verify that residual moisture is not draining from the disposal cell and it is not providing a continuing source of contamination.

The compliance strategy for the terrace west area is no remediation with the application of supplemental standards with monitoring because the system qualifies as limited-use ground water, based on the existence of widespread ambient contamination not related to previous milling activities. Monitoring and ground water sampling in this area will continue semiannually for the next 5 years to ensure that current beneficial uses of the ground water are not being affected by contaminants from the former millsite.

All these proposed actions will reduce concentrations of mill-related constituents in the floodplain ground water, the adjacent San Juan River, and terrace east ground water and will minimize any potential for risk to human health and the environment. Where necessary, administrative actions and field activities will be implemented to minimize any risk to human health and the environment during and after active remediation. These actions would include institutional controls oversight, wildlife management, and waste management.

Institutional Controls

For the UMTRA Ground Water Project, institutional controls reduce exposure to or reduce health risks by (1) preventing inappropriate intrusion into contaminated ground water or (2) restricting access to or use of contaminated ground water for unacceptable purposes, such as domestic-household use.

Institutional controls were implemented on the floodplain at the Shiprock site to minimize the potential for risk to human health and the environment. These institutional controls include

- Grazing restrictions in effect for at least 10 to 20 years during remediation in which grazing allottees will be compensated.
- DOE and Navajo Nation control of access to the floodplain.
- A DOE and Navajo Nation agreement to prohibit drilling of new wells or other use of ground water in the floodplain during remediation.
- Assurance from the Navajo Nation Water Code Administration that flowing artesian well 648 will be allowed to continue flowing into Bob Lee Wash and onto the floodplain. Flow from this well for the past 40 years has flushed contaminants from much of the floodplain and the success of remediation depends on its continued flow.

Long-Term Surveillance and Maintenance

Once the compliance strategy has been finalized, it is the responsibility of DOE to ensure that the selected compliance strategy continues to be protective of human health and the environment. Ground water sites become part of the Long-Term Surveillance and Maintenance (LTSM) Program administered by the DOE Grand Junction Office. The LTSM Program manages the site according to a Long-Term Surveillance Plan prepared specifically for the Shiprock site.

Program Documents

The following program documents are available on the DOE Grand Junction Office Internet website at http://www.gjo.doe.gov/ugw:

- *UMTRA Ground Water Project, Site Observational Work Plan for the Shiprock, New Mexico, UMTRA Project Site*, November 2000
- *UMTRA Ground Water Project, Environmental Assessment of Ground Water Compliance at the Shiprock Uranium Mill Tailings Site*, September 2001
- *Finding of No Significant Impact, Ground Water Compliance at the Shiprock Uranium Mill Tailings Site*, October 2001

Contacts

U.S. Department of Energy Grand Junction Office
2597 B ¾ Road, Grand Junction, CO 81503

Donald Metzler, Program Manager,
(970) 248–7612

Audrey Berry, Public Affairs Specialist,
(970) 248–7727

DOE Grand Junction Office
Toll-free (800) 399–5618

or visit the Internet site at
http://www.gjo.doe.gov/ugw

Navajo Nation AML Reclamation/ UMTRA Department

Madeline Roanhorse, Department Director
Division of Natural Resources
(928) 871–6982